

Docket No.: 87353.2980

Customer No. 30734

What is claimed is:

1. A dock leveler, comprising:
  - a base assembly;
  - a ramp assembly configured to rotate from a generally vertical stored position to one or more lowered operating positions, wherein the ramp assembly is pivotally coupled to said base assembly at a pivot point; and,
  - a counterbalance assembly comprising:
    - a first anchor point;
    - a second anchor point;
    - at least one effective anchor point; and,
    - a biasing member having a central longitudinal axis defining a line of action, wherein the biasing member is coupled to the ramp assembly at said first anchor point and to the base assembly or a dock at the second anchor point, and wherein said at least one effective anchor point has a location along the line of action, and which location relative to the pivot point changes as said ramp assembly rotates.
2. A dock leveler according to claim 1, wherein the biasing member is a spring.
3. A dock leveler according to claim 1, wherein the biasing member is coupled to the second anchor point via a flexible member.
4. A dock leveler according to claim 3, wherein the biasing member is attached to the flexible member at an attachment point and the location of the at least one effective anchor point is at the attachment point of the biasing member and flexible member.

Docket No.: 87353.2980  
Customer No. 30734

5. A dock leveler according to claim 3, wherein the flexible member is chosen from a chain, a cable, and a band.
6. A dock leveler according to claim 5, wherein the flexible member is a chain.
7. A dock leveler according to claim 3, wherein the base assembly comprises a cam plate having at least one cam surface shaped to deflect the line of action as the ramp assembly rotates by selectively engaging the flexible member.
8. A dock leveler according to claim 7, wherein the biasing member is coupled at the second anchor point to the base assembly.
9. A dock leveler according to claim 7, wherein the biasing member is a spring and the cam plate includes an anchor hole at which the spring is fixedly coupled to the base assembly via the flexible member, an upper cam surface having a shape, and a lower cam surface having a shape, wherein the upper cam surface, lower cam surface, anchor point, and flexible member cooperate to deflect the line of action as the ramp assembly rotates.
10. A dock leveler according to claim 9, wherein the ramp assembly has a weight moment and the shape of the lower cam surface is configured to provide a spring moment that is less than the weight moment of the ramp assembly when the ramp assembly is in the operative position.
11. A dock leveler according to claim 9, wherein the ramp assembly has a

Docket No.: 87353.2980

Customer No. 30734

weight moment and the shape of the upper cam surface is configured to provide a spring moment that is greater than the weight moment of the ramp assembly at least as the ramp assembly rotates above the operative position.

12. A dock leveler according to claim 11, wherein the shape of the upper cam surface is configured to provide a spring moment that is approximately equal to the weight moment of the ramp assembly when the ramp assembly is in the stored position.

13. A dock leveler according to claim 9, wherein the one or more lowered operating positions are in a generally horizontal working range, the dock leveler has a net moment which can vary as the ramp assembly rotates, and the net moment is in the downward direction when the ramp assembly is in the vertical stored position, the net moment is relatively constant in the generally horizontal working range, and the net moment is in the upward direction through a region between the generally horizontal working range and the vertical stored position.

14. A dock leveler according to claim 13, wherein the net moment is approximately zero at a position between the vertical stored position and the one or more operative positions.

15. A dock leveler according to claim 13, wherein the generally horizontal working range includes positions where an end of the ramp assembly is about eight inches above horizontal to a position where the end of the ramp assembly is about eight inches below horizontal.

16. A counterbalance assembly for a mechanically-operated, vertically-storing

Docket No.: 87353.2980

Customer No. 30734

dock leveler having a rotating ramp assembly, comprising:

tension means for counterbalancing the ramp assembly of a dock leveler,  
wherein the tension means has a first end and a second end;

means for fixedly coupling said first end of said tension means to the ramp  
assembly at a first anchor point;

means for flexibly coupling said second end of said tension means to a  
base assembly of the dock leveler at a second anchor point, wherein the first  
anchor point and second anchor point define a direct line of action; and,

camming means configured to selectively engage the means for flexibly  
coupling such that the tension means is deflected away from the direct line of  
action when the tension means is incorporated in the dock leveler and the ramp  
assembly rotates.

17. A counterbalance assembly according to claim 16, wherein the tension  
means is a spring.

18. A counterbalance assembly according to claim 17, wherein the means for  
fixedly coupling said second end comprises an adjusting bolt and a spring anchor  
bracket, and wherein the means for flexibly coupling said first end comprises a  
flexible tensile member chosen from a chain, a band, and a cable.

19. A method for counterbalancing a mechanically-operating, vertically-  
storing dock leveler having a rotating ramp assembly attached to a base assembly  
at a pivot point, comprising:

coupling a spring to the dock leveler with a flexible attachment device;  
and,

providing a camming surface configured to cooperate with the flexible

Docket No.: 87353.2980

Customer No. 30734

attachment device to deflect the spring away from a direct line of action in response to the ramp assembly rotation.

20. A method according to claim 19, wherein the camming surface is shaped to cause the spring to deflect toward the pivot point as the ramp assembly rotates downwardly.